

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Previously Presented) An apparatus comprising:
a medical device adapted to be inserted into an anatomy; and
a plurality of target markers disposed on a proximal portion of the medical device,
wherein geometric information for the plurality of target markers is stored in a magnetic resonance imaging (MRI) system prior to insertion of the medical device into the anatomy, and wherein the MRI system is unable to detect or will disregard MRI signals of the target markers within the anatomy as noise without using the stored information for the plurality of target markers to lower an MRI signal detection threshold of the MRI system.
2. (Currently Amended) The apparatus of claim 1, wherein the plurality of target markers comprise at least one of ferromagnetic and paramagnetic material.
3. (Currently Amended) The apparatus of claim 2, wherein the MRI signals of the plurality of target markers are disregarded by the MRI ~~systems~~ system as noise operating between 0.2 and 5.0 Tesla.
4. (Previously Presented) The apparatus of claim 1, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.
5. (Original) The apparatus of claim 4, wherein the medical device comprises a polymer material.
6. (Original) The apparatus of claim 4, wherein the medical device is expandable.
7. (Currently Amended) The apparatus of claim 1, wherein ~~the orientation~~ orientation and location of the medical device in relation to the anatomy is determinable based on ~~the location~~ location of the plurality of target markers in relation to the medical device.
8. (Currently Amended) A system comprising:

a magnetic resonance imaging (MRI) processor, the processor including an MRI low-level signal detection process stored in a memory;

a MRI scanner coupled to the processor;

a control unit coupled to the processor;

a display coupled to the processor; and

a medical device adapted to insert into an anatomy, the medical device having a plurality of target markers, wherein geometric information for the plurality of target markers is stored in the memory prior to insertion of the medical device into the anatomy, and wherein MRI signals of the plurality of target markers within the anatomy are not detectable or are disregardable as noise for the system ~~MRI systems~~ (a) without the MRI low-level signal detection process and (b) without using the stored geometric information of the plurality of target markers prior to insertion of the medical device into the anatomy to lower an MRI signal detection threshold.

9. (Original) The system of claim 8, further comprising a pre-scanning device coupled to the processor.

10. (Currently Amended) The system of claim 9, wherein the ~~pre-scanner~~ pre-scanning device transmits is to transmit at least one of a plurality of geometric data, a plurality of image data, ~~and a~~ a plurality of geometric data and a plurality of image data of ~~a medical~~ the medical device and the plurality of target markers to the processor.

11. (Currently Amended) The system of claim 8, wherein the plurality of target markers comprise at least one of ferromagnetic and paramagnetic material.

12. (Currently Amended) The system of claim 11, wherein MRI signals of the plurality of target markers are disregarded by ~~MRI systems~~ the system operating between 0.2 and 5.0 Tesla.

13. (Currently Amended) The system of claim 8, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.

14. (Original) The system of claim 13, wherein the medical device comprises a polymer material.

15. (Original) The system of claim 14, wherein the medical device is expandable.

16. (Currently Amended) The system of claim 8, wherein an orientation and a location of the medical device in relation to the anatomy is determinable based ~~on the~~ on a location of the plurality of target markers.

17. (Previously Presented) The system of claim 8, wherein an image of the medical device is superimposed on an image of the anatomy, the superimposed image having the same orientation and location that the medical device has within the anatomy.

18. (Currently Amended) The system of claim 8, wherein a plurality of pixels of the medical device replace a plurality of pixels of an image of ~~an anatomy~~ the anatomy at a same location that the medical device is located within the anatomy, the plurality of pixels of the medical device having the same orientation that the medical device has within the anatomy.

19. (Previously Presented) The system of claim 8, wherein the memory stores one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of the medical device.

20. (Previously Presented) The system of claim 8, wherein the MRI low-level signal detection process adjusts the signal detection threshold to detect a low-level MRI signal produced from the target markers.

21. (Previously Presented) The system of claim 20, wherein a non-adjusted signal threshold will one of disregard or fail to detect the low-level MRI signal produced from the target markers.

22. (Currently Amended) The system of claim 8, wherein the MRI low-level signal detection process determines to recognize low-level MRI signals returned from the target markers upon a match from a comparison of known geometric data from the target markers with ~~the returned~~ returned low-level MRI signals.

23. (Currently Amended) A method comprising:

inserting a medical device into an anatomy, the medical device having a plurality of target markers;

storing ~~geometric~~ information for the medical device and the plurality of target markers in a memory prior to insertion of the medical device into the anatomy;

scanning a magnetic resonance image (MRI) of the anatomy;
processing the scanned image by a MRI processor coupled to the memory;
determining a location and orientation of the medical device inserted in the anatomy in relation to the anatomy based on the plurality of target markers; and
displaying ~~a precise image~~ an image of the medical device within the anatomy, including superimposing the medical device on the anatomy using the information for the medical device stored in the memory prior to insertion of the medical device into the anatomy ~~wherein MRI signals of the plurality of target markers within the anatomy are disregarded as noise or undetectable for MRI systems without using the stored information of the plurality of target markers prior to insertion of the medical device into the anatomy to lower an MRI signal detection threshold.~~

24. (Currently Amended) The method of claim 23, further comprising:
pre-scanning the medical device before inserting the medical device into the anatomy ~~an anatomy~~; and
transmitting one of a plurality of geometric data, a plurality of image data, or a plurality of geometric data and a plurality of image data of the medical device and the plurality of target markers to the MRI processor.
25. (Currently Amended) The method of claim 23, wherein the plurality of target markers comprise at least one of ferromagnetic and paramagnetic material.
26. (Currently Amended) The method of claim 25, wherein MRI signals of the plurality of target markers are one of not detectable and disregarded by ~~MRI systems~~ an MRI system operating between 0.2 and 5.0 Tesla.
27. (Original) The method of claim 23, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.
28. (Original) The method of claim 27, wherein the medical device comprises a polymer material.
29. (Original) The method of claim 27, wherein the medical device is expandable.

30. (Currently Amended) The method of claim 23, further including superimposing a stored image of the medical device over an image of the ~~anatomy~~, ~~the anatomy~~, the superimposed image having the same orientation and location that the medical device has within the anatomy.

31. (Currently Amended) The method of claim 23, further including replacing a plurality of pixels of an image of ~~an anatomy~~ the anatomy with a plurality of pixels of the medical device at the same location that the medical device is located within the anatomy, the plurality of pixels of the medical device having the same orientation that the medical device has within the anatomy.

32. (Currently Amended) The method of claim 23, wherein, prior to insertion of the medical device into the anatomy, the memory stores one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of ~~a medical~~ the medical device and the plurality of target markers.

33. (Currently Amended) The method of claim 23, wherein processing the scanned image further includes:

adjusting ~~the signal~~ a signal detection threshold to detect low-level MRI signals produced from the plurality of target markers, wherein if the signal detection threshold is unadjusted the low-level MRI signals produced from the plurality of target markers will be disregarded.

34. (Currently Amended) An apparatus comprising a machine-readable medium ~~containing~~ storing instructions which, when executed by a magnetic resonance imaging (MRI) system ~~machine~~, cause the MRI system ~~machine~~ to perform operations comprising:

storing geometric information for a plurality of target markers of a medical device in a memory prior to insertion of the medical device into an anatomy;

scanning a magnetic resonance image ~~(MRI) of~~ of the anatomy with the medical device inserted into the anatomy;

processing the scanned image by a MRI processor coupled to the memory, the MRI processor having an MRI low-level signal detection process;

determining a location and orientation of the medical device in relation to the anatomy based on the geometric information of the plurality of target markers; and

displaying ~~a precise image~~ an image of the medical device within the anatomy, wherein MRI signals of the plurality of target markers within the anatomy are undetectable or

disregardable as noise for ~~MRI systems~~ the MRI system without using the stored geometric information of the plurality of target markers prior to insertion of the medical device into the anatomy to lower an MRI signal detection threshold.

35. (Currently Amended) The apparatus of claim 34, further containing instructions which, when executed by the ~~machine~~ MRI system, cause the ~~machine~~ MRI system to perform operations including:

pre-scanning the medical device before the medical device is inserted in the anatomy ~~an anatomy~~;

transmitting one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of ~~a medical~~ the medical device and the plurality of target markers to the MRI processor; and

withdrawing ~~a medical~~ the medical device from ~~an anatomy~~ the anatomy at a dynamically adjusted pace.

36. (Currently Amended) The apparatus of claim 34, wherein the plurality of target markers comprise at least one of ferromagnetic and paramagnetic material.

37. (Currently Amended) The apparatus of claim 36, wherein the MRI signals of the plurality of target markers are one of not detectable and disregarded by the MRI system ~~MRI systems~~ operating between 0.2 and 5.0 Tesla.

38. (Original) The apparatus of claim 34, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.

39. (Original) The apparatus of claim 38, wherein the medical device comprises a polymer material.

40. (Original) The apparatus of claim 38, wherein the medical device is expandable.

41. (Currently Amended) The apparatus of claim 34, further containing instructions which, when executed by the ~~machine~~ MRI system, cause the ~~machine~~ MRI system to perform operations including:

superimposing an image of the medical device over an image of the anatomy, the superimposed image has the same location and orientation that the medical device has within the anatomy.

42. (Currently Amended) The apparatus of claim 34, further containing instructions which, when executed by the ~~machine~~ MRI system, cause the ~~machine~~ MRI system to perform operations including:

replacing a plurality of pixels of an image of ~~an anatomy~~ the anatomy with a plurality of pixels of the medical device, the plurality of pixels of the medical device having the same location and orientation that the medical device has within the anatomy.

43. (Currently Amended) The apparatus of claim 34, wherein the memory stores one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of ~~a medical~~ the medical device.

44. (Previously Presented) The apparatus of claim 34, wherein the MRI low-level signal detection process adjusts the signal detection threshold to detect a low-level MRI signal produced from the target markers.

45. (Currently Amended) An apparatus comprising a machine-readable medium ~~containing~~ storing instructions which, when executed by a ~~machine~~ MRI system, cause the ~~machine~~ MRI system to perform operations comprising:

storing geometric information for a medical device and a plurality of target markers of a medical device in a memory prior to insertion of the medical device into an anatomy;

scanning a magnetic resonance image (~~MRI~~) ~~of the~~ of the anatomy with the medical device inserted;

processing the scanned image by a MRI processor coupled to the memory, the MRI processor having an MRI low-level signal detection process;

determining a location and orientation of the medical device in relation to the anatomy based on detection of the plurality of target markers in relation to the medical device and each of the plurality of target markers, ~~wherein geometric data of the medical device and the plurality of target markers is stored before the medical device is inserted into the anatomy;~~ and

displaying ~~a precise image~~ an image of the medical device within the anatomy, wherein MRI signals of the plurality of target markers within the anatomy are undetectable or disregardable as noise for ~~MRI systems~~ the MRI system without the MRI low-level signal detection process and without using the geometric information of the plurality of target markers to lower an MRI signal detection threshold.

46. (Previously Presented) The apparatus of claim 45, wherein the MRI low-level signal detection process adjusts the signal detection threshold to detect a low-level MRI signal produced from the plurality of target markers.

47. (Currently Amended) A system comprising:

- a magnetic resonance imaging (MRI) processor, the processor including an MRI low-level signal detection process stored in a memory;

- a MRI scanner coupled to the processor;

- a control unit coupled to the processor;

- a display coupled to the processor; and

- a medical device to insert into an anatomy, the medical device having a plurality of target markers, wherein geometric information for the plurality of target markers is stored in the memory prior to insertion of the medical device into the anatomy, and wherein MRI signals of the plurality of target markers within the anatomy are undetectable or disregardable as noise for ~~MRI systems~~ an MRI system without the MRI low-level signal detection process and without using the stored geometric information of the plurality of target markers to lower an MRI signal detection threshold, and wherein the system is to use the geometric information ~~includes~~ geometric information of ~~the medical device and each of~~ the plurality of target markers to determine location and orientation of the medical device in relation to the anatomy.

48. (Previously Presented) The system of claim 47, wherein the MRI low-level signal detection process adjusts the signal detection threshold to detect a low-level MRI signal produced from the target markers.

49. (Currently Amended) The system of claim 48, wherein ~~the geometric~~ geometric information of the medical device and a position of the detected plurality of target markers are used to display an image of the medical device superimposed on an image of ~~an anatomy~~ the

anatomy, the ~~combined images~~ image representative of the actual location and orientation of the medical device in the anatomy.